R E P O R T R E S U M E S

ED 003 568 56

A COMPARATIVE STUDY IN THE TEACHING OF HIGH SCHOOL CHEMISTRY AND PHYSICS.

BY- BRYAN, EDWARD E.
OKLAHOMA STATE DEPT OF EDUCATION, OKLAHOMA CITY

REPORT NUMBER NDEA-VIIA-447 PUB DATE SEP 61
GRANT OEG-7-34-092-00
EDRS PRICE MF-$0.09 HC-$2.20 55P.

DESCRIPTORS- *COMPARATIVE ANALYSIS, *TELEVISED INSTRUCTION, *CHEMISTRY, TELEVISION RESEARCH, PROGRAM EVALUATION, *PHYSICS INSTRUCTION, *HIGH SCHOOL STUDENTS, TEACHING TECHNIQUES, OKLAHOMA CITY, OKLAHOMA

AN EVALUATION WAS MADE OF SEVERAL INSTRUCTIONAL METHODS FOR EDUCATIONAL TELEVISION. THIRTY-SIX EXPERIMENTAL CLASSES OF HIGH SCHOOL STUDENTS (225) ENROLLED IN PHYSICS OR CHEMISTRY CLASSES WERE SELECTED BY STRATIFIED RANDOM SAMPLING. THE THREE TREATMENTS INCLUDED (1) TELEVISION AND CORRESPONDENCE COURSES, (2) TELEVISION AND VISITS BY STUDENTS IN EDUCATION, AND (3) TELEVISION, AND BOTH CORRESPONDENCE AND VISITS. DATA WERE GATHERED BY PRE- AND POST-TESTS AND A QUESTIONNAIRE OF ATTITUDES. NO SIGNIFICANT DIFFERENCES AMONG THE THREE PHYSICS GROUPS WERE FOUND. CONSIDERABLE VARIATION, HOWEVER, WAS NOTED BETWEEN THE CHEMISTRY GROUPS. THE TELEVISION-CORRESPONDENCE-VISITATION TREATMENT GROUP PRODUCED SIGNIFICANT ACHIEVEMENT GAINS OVER THE OTHER CHEMISTRY GROUPS. (RS)

ED003568

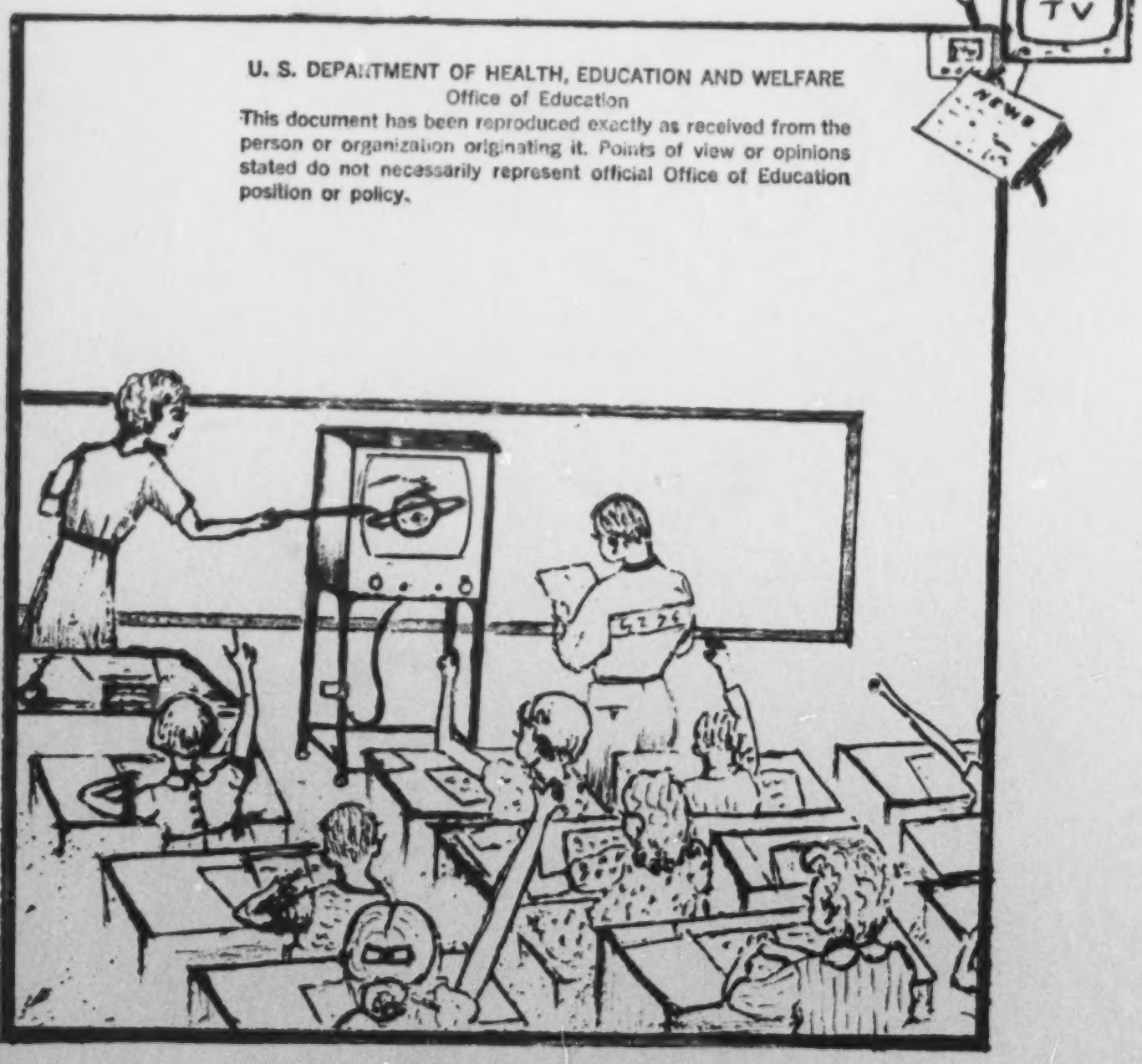
447

A COMPARATIVE STUDY IN THE TEACHING OF HIGH SCHOOL CHEMISTRY AND PHYSICS

Edward F. Bryan

Oklahoma State Department of Education

September 1961



U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
Office of Education
This document has been reproduced exactly as received from the person or organization originating it. Points of view or opinions stated do not necessarily represent official Office of Education position or policy.

The research reported herein was supported by a grant from the United States Office of Education, Department of Health, Education, and Welfare
Grant No. 7-34-092.00

this is title

A STUDY WHICH COMPARES INSTRUCTION IN HIGH SCHOOL PHYSICS AND CHEMISTRY VIA TELEVISION PLUS CORRESPONDENCE COURSES, TELEVISION PLUS VISITATION BY COLLEGE STUDENTS PREPARING TO TEACH, AND TELEVISION PLUS BOTH CORRESPONDENCE COURSES AND PERSONAL VISITATION BY COLLEGE STUDENTS PREPARING TO TEACH

Principal Investigator

Edward F. Bryan, Director
Division of Television Instruction
Oklahoma State Department of Education

The research reported herein was supported by a grant from the United States Office of Education, Department of Health, Education and Welfare

RECCGNITION AND ACKNOWLEDGEMENT

Early in 1960 a research proposal entitled A Study Which Compares Instruction in High School Physics and Chemistry Via Television Plus Correspondence Courses, Television Plus Personal Visitation by College Students Preparing to Teach, and Television Plus Both Correspondence Courses and Personal Visitation by College Students Preparing to Teach, was submitted to the Commissioner of Education, U. S. Office of Education, Department of Health, Education and Welfare for approval. In due time, it became known as Grant No. 7-34-092.00 under the National Defense Education Act of 1958; and the proposed research was consummated in the ten month period between September 1, 1960 and June 30, 1961. Therefore, the research reported herein was supported and made possible by a grant from the United States Office of Education, Department of Health, Education and Welfare, in conjunction with funds provided by the Oklahoma Educational Television Authority, and the Oklahoma State Department of Education.

It must be recognized first and foremost that a project of such nature could not be carried out except through the diligent co-operation of the receiving classroom teachers and administrators, who in most cases gave willingly of their time and effort from their already heavy schedules.

The members of the project staff wish to express appreciation to the various colleges of the State of Oklahoma, for the splendid co-operation in recommending capable conscientious college students for the Weekly Visitation. These college students were most diligent in their work and went beyond the call of duty to render service to the receiving teachers and the respective classes.

Dr. Carl Pass and Mr. John Harms were most co-operative and efficient with their assignments of grading correspondence lessons. Their written comments to the pupil were most constructive and covered not only the subject area but also grammar, spelling, and punctuation, which are important in any teaching situation.

Dr. Robert Schofield was most sincere and understanding in rendering his services in the preparation of the statistical analyses. He has had broad experience in the area of value-attitudes which proved to be most valuable.

CONTENTS

		Page
	RECOGNITION AND ACKNOWLEDGEMENT	ii
	TABLE OF CONTENTS	iv
	LIST OF TABLES	v
	INTRODUCTION	vi
I.	PROCEDURE	1
II.	PROJECT DEVELOPMENTS	4
III.	RESULTS AND CONCLUSIONS	7

APPENDIXES

A.	PROPOSAL FOR THE STUDY	17
B.	PARTICIPATING INSTITUTIONS	25
C.	TEST INFORMATION	28
D.	VALUE-ATTITUDE QUESTIONNAIRE	32
E.	TABULATION OF VALUE-ATTITUDE QUESTIONNAIRE	37
F.	CORRESPONDENCE SCORE SHEETS	45

LIST OF TABLES

Table		Page
1.	The Read General Science Test Mean Scores	7
2.	Mean Scores of Achievement on the Respective Post-tests	8
3.	Physics Test--Individual Pupils' Raw Score	9
4.	Chemistry Test--Individual Pupils' Raw Score	10
5.	Analysis of Covariance For Physics Groups on Achievement Data	11
6.	Analysis of Covariance For Chemistry Groups on Achievement Data	11
7.	Indicated Means of Value-Attitude Statements--Chemistry Students	12
8.	Indicated Means of Value-Attitudes Statements--Physics Students	13

INTRODUCTION

Problem

The purpose of this project of Educational Research is to discover, if possible, methods of instruction in conjunction with educational television, which are most conducive to learning in the subject areas of chemistry and physics. Thus, the problem may be formally stated as: What levels of achievement will instruction in high school chemistry and physics yield when instruction is offered by television plus correspondence courses, television plus personal visitations by college students preparing to teach, and television plus both correspondence courses and personal visitations by college students preparing to teach.

Objectives

First Hypothesis: There are no differences in achievement among high school students who receive chemistry and physics instruction by television plus correspondence study; those who receive instruction by television plus personal visitation by college students preparing to teach; and, those who receive instruction by television plus both correspondence courses and personal visitations by college students preparing to teach.

Second Hypothesis: There are no differences in stated value-attitudes toward instructional television classes among high school students who receive chemistry and physics instruction by television

plus correspondence study; those who receive instruction by television plus personal visitation by college students preparing to teach; and those who receive instruction by television plus both correspondence courses and personal visitation by college students preparing to teach.

CHAPTER I

PROCEDURE

a. General Method and Experimental Design

All schools requesting approval of high school credit in chemistry and physics through the medium of television instruction were informed of the nature of the research and were invited to participate. Nineteen schools with a total enrollment of 128 volunteered for chemistry, while sixteen schools with a total enrollment of 97 volunteered for physics.

Each group was placed in the various strata according to the district enrollment in the subject for television credit.

1 - 2 Students	Strata 1
3 - 5 Students	Strata 2
6 -10 Students	Strata 3
11 or more Students	Strata 4

The school districts were placed in the various strata and selected at random to receive the various methods of instruction. This was done to keep students in the same school from receiving different methods of instruction which might tend to cancel results.

The random selection resulted in the following classification:

Chemistry

Instructional Combination	No. Schools	Enrollment
T. V. Plus Correspondence	6	56
T. V. Plus Visitation	7	41
T. V. Plus Correspondence Plus Visitation	6	31
Total Groups	19	128

Physics

Instructional Combination	No. Schools	Enrollment
T. V. Plus Correspondence	5	23
T. V. Plus Visitation	6	42
T. V. Plus Correspondence Plus Visitation	6	32
Total Groups	17	97

b. Data

The Read General Science Test was used as a pre-test for all groups in both the chemistry and physics classes to measure previous achievement.

The Cooperative Chemistry Test, Form N., of The American Chemical Society and The National Science Teacher Association was used as a post-test in the chemistry classes as a measure of achievement in chemistry. The Ohio Every Pupil Physics Test was used as a post-test in the physics classes as a measure of achievement in physics.

A questionnaire to measure stated value-attitudes was constructed by use of information from the study by Neidt and French[1] and from the Hibbs Study[2]. Observations of the principal investigator, and the ten (10) college students were also used in the construction of the questionnaire.

---

1. Charles O. Neidt and Joseph I. French, Reaction of High School Students to Television Teachers (University of Nebraska, Lincoln, 1958)

2. Elvin Leon Hibbs, "Value-Attitudes of Administrators, Teachers, and Students Concerning Instructional Television Classes" (unpublished Ed. D. dissertation Oklahoma State University, 1959)

c. Methods of Statistical Analyses

Comparison of means through analyses of variance, covariance and the t-test were used to analyse the data to ascertain the levels of achievement and value-attitudes elicited by the three methods of instruction in conjunction with television instruction in each of the subject areas. Analysis of variance was not called for in the original plan, but was applied to the data as an additional means of verifying the original analyses.

CHAPTER II

PROJECT DEVELOPMENTS

The approval of high school credit for chemistry and physics by television was made on an emergency basis by the Oklahoma State Board of Education. The courses were to be limited to those students with outstanding ability and a special interest in the subject to be studied. Also, it was specified that the local or receiving school is to schedule the subject for three hundred minutes per week including time for passing between classes. This means the class should have met thirty minutes per day in addition to the telecasts, and one full hour on the one day per week when the telecast is not on the air. A local teacher was assigned to the class one hour daily, who should assume the responsibility of teaching along with that of supervising the telecasts, which was to be a team instructional approach.

Most of the schools did a fine job of selecting students, but in a few cases all pupils were enrolled regardless of ability or special interest. This practice naturally developed problems, as several students did not have the background for the program which is generally accepted as being somewhat accelerated, in both subjects. The John Baxter Films were used for the chemistry course while The Harvey White Films were used for the physics course. Several pupils dropped out of the project due to the inability to keep up with the pace set by the films. Still others dropped for various causes such as parents moving from the school district, lack of interest, lack of motivation,

personal reasons or disciplinary measures. The results showing that approximately seventy-five pupils completed the project in each course.

Several other variables also entered into the project which have had a tendency to keep conclusions from being meaningful other than the small enrollment completing the courses. One of the variables was the difference in the qualifications of the local or receiving teacher, while another variable was the varying degrees of acceptance of responsibilities of the role of a teacher rather than merely that of supervising the class during the telecasts.

Those schools having correspondence courses in conjunction with the other work also varied to a certain degree in the time and promptness of sending the lessons for grading. It was generally observed that those getting behind with these lessons also turned in the poorer papers.

The work of the college students visiting the various classes was most gratifying as these young people were quite capable and most sincere in their work. They were accepted very well by both the receiving teacher and pupils.

The pupil attitude as a whole was somewhat mixed as expressed to the principal investigator in regard to television instruction. However, as a whole, most pupils expressed appreciation for the media and the opportunities it had made possible for them. The attitude toward the correspondence lessons were rather two-fold in nature. First, the bright alert pupil interested in the subject was definitely enthusiastic while the slower pupil with less interest in the subject

thought it was just too much extra work. The pupils as a whole were impressed with the visiting college students and appreciated their services. The only criticism of their work was that in some cases, they talked above the high school pupils' level of comprehension. The attitude toward those grading correspondence lessons was excellent, and the corrective remarks were considered constructive and greatly appreciated by the students.

CHAPTER III

RESULTS AND CONCLUSIONS

The Read General Science Test was used as a pre-test for all groups both in the area of chemistry and of physics. The mean score with respect to achievement for each group is shown in Table I.

TABLE 1

THE READ GENERAL SCIENCE TEST
MEAN SCORES

Methods of Instruction	Chemistry	Physics
T. V. Plus Correspondence	50.32	50.20
T. V. Plus Visitation	42.24	49.16
T. V. Plus Correspondence Plus Visitation	49.16	55.83
Total Groups	47.26	52.06

Analysis of variance indicated there was no significant difference between the chemistry students and the physics students nor was there a significant difference between the three physics groups. However, there was a significant difference ($F = 3.71$, $df = 2$, $p < .05$) between the three chemistry groups. By applying t-test, we find a significant difference ($t = 2.46$, $df = 52$, $p < .02$) between groups television plus correspondence and television plus visitation. However, no significant difference ($t = .42$, $df = 52$, $p > .05$) between television plus correspondence and television plus correspondence plus visitation was found in the pre-test data.

The results of the administration of the two post-tests, the A.C.S. - N.S.T.A. Cooperative Examination, Form N. for Chemistry and the Ohio Every Pupil Test for Physics, are presented in Table 2.

TABLE 2

MEAN SCORE OF ACHIEVEMENT ON THE RESPECTIVE POST-TESTS

Methods of Instruction	Chemistry	Physics
T. V. Plus Correspondence	16.1	37.3
T. V. Plus Visitation	10.5	40.97
T. V. Plus Correspondence Plus Visitation	24.9	42.48
Total Groups	17.2	40.25

Analysis of variance used on the physics data indicated no significant difference among the three groups. However, analysis of variance used on the chemistry data indicated a significant difference ($F = 6.856$, $df = 2$, $p < .01$) between the three groups. Further analyses indicated that the group receiving television plus correspondence plus visitation achieved significantly better than the group receiving television plus correspondence ($F = 2.304$, $p < .05$), as well as achieving significantly better than the group receiving television plus visitation ($F = 3.664$, $p < .01$). No significant difference in achievement was found between the group receiving television plus correspondence and the group receiving television plus visitation.

In order to examine the effects of the three methods of instruction, as measured by achievement in each of the subject areas, assuming general science knowledge is held constant, the data were analyzed by applying analysis of covariance. This analysis still indicated no significant difference between the three methods of instruction in the physics area as is shown in Table 5.

The analysis of the chemistry data for the three methods of instruction indicated a significant difference between the groups as indicated in Table 6.

TABLE 3

PHYSICS TEST
INDIVIDUAL PUPILS' RAW SCORE

Television Plus Correspondence		Television Plus Visitation		Television Plus Correspondence Plus Visitation	
Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test
56	45	36	49	56	49
54	37	53	22	52	52
31	29	42	56	36	30
47	28	46	55	54	35
40	22	34	69	67	72
62	43	45	45	61	58
42	28	44	38	66	76
43	30	44	36	54	37
53	36	45	28	54	42
55	41	54	60	55	34
43	45	51	55	34	31
10	38	55	47	68	77
60	62	46	51	53	40
66	64	14	18	36	29
57	35	42	27	58	54
36	41	54	33	58	31
60	35	51	17	64	59
60	34	49	26	67	59
51	26	43	24	52	36
58	28	43	31	42	13
		59	31	37	27
		38	16	48	13
		45	67	47	19
		64	66		
		58	47		
		54	42		
		59	32		
		63	31		
		50	38		
		58	46		
		63	35		
		60	52		

TABLE 4

CHEMISTRY TESTS
INDIVIDUAL PUPILS' RAW SCORES

Television Plus Correspondence		Television Plus Visitation		Television Plus Correspondence Plus Visitation	
Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test
45	28	61	34	56	51
42	17	46	38	68	74
52	31	66	39	55	26
47	35	29	18	37	22
49	20	28	15	66	60
56	39	56	23	54	40
60	53	37	25	57	34
49	26	39	29	52	41
65	69	50	22	42	29
57	34	42	18	41	36
62	63	60	30	60	33
55	43	57	23	55	33
48	6	58	35	50	32
51	22	45	24	58	28
32	6	22	20	60	46
38	17	48	23	64	51
52	21	40	19	50	28
42	20	24	29	48	34
38	35	31	28	40	39
52	32	23	27	32	36
62	17	50	17	28	38
40	18	31	16	41	27
62	22	31	27	40	32
58	38			34	30
36	25				
60	31				
62	33				

TABLE 5

ANALYSIS OF COVARIANCE FOR PHYSICS GROUPS ON ACHIEVEMENT DATA

Source	df	SSxy	MSxy	F
Between	2	815	407.5	2.663*
Within	73	11199	153	

*Not significant

TABLE 6

ANALYSIS OF COVARIANCE FOR CHEMISTRY GROUPS ON ACHIEVEMENT DATA

Source	df	SSxy	MSxy	F
Between	2	1359	679.5	6.35*
Within	73	7800	107	

*Significant beyond .01 level

A regression coefficient for "within groups" was derived and found to be .48. This is not a very large coefficient and thus would that there is not a very large influence of general science knowledge upon achievement in chemistry. A regression coefficient also was derived "between groups" which was found to be .62. It would seem that achievement in chemistry is affected somewhat greater by the groups previous general science knowledge. However, again, this is not to a great extent.

We find in chemistry, when previous general science knowledge is accounted for, that the methods or combination of methods of instruction do have influence at a significant level upon the achievement of the

students. Further, as previously noted, instruction by television plus correspondence plus visitation does have the greatest influence to a significant degree.

The results of the attitude questionnaire are given in Table 7, and Table 8, for chemistry and physics students respectively.

TABLE 7

INDICATED MEANS OF VALUE-ATTITUDE STATEMENTS
CHEMISTRY STUDENTS

Question	Television Plus Correspondence	Television Plus Visitation	Television Plus Correspondence Plus Visitation	Mean
1.	3.81	2.86	2.95	3.21
2.	1.36	1.00	1.77	1.38
3.	1.54	1.54	1.48	1.52
4.	4.21	4.04	4.29	4.18
5.	4.61	3.86	4.62	4.36
6.	2.71	....	2.59	2.65
7.	.77	2.11	.64	1.17
8.	3.43	3.30	4.23	3.65
9.	....	3.79	4.05	3.92
10.	1.07	1.25	1.36	1.23
11.	1.30	2.19	1.14	1.54
12.	2.89	3.32	3.23	3.15
13.	3.86	3.18	4.45	3.83
14.	1.63	2.07	1.59	1.76
15.	....	3.96	3.91	3.92
16.	1.26	1.25	.27	.93
17.	1.22	....	1.18	1.20
18.	1.36	.96	.68	1.00
19.	2.50	2.86	2.95	2.77
20.	1.75	1.60	1.32	1.56
21.	4.43	2.86	4.18	3.82
22.	3.00	2.36	3.45	2.94
23.	.75	1.46	.23	.81
24.	2.21	3.04	1.05	2.10
25.	2.11	2.10	3.55	2.59
26.	3.04	3.00	3.05	3.03
27.	2.18	3.01	1.86	2.35
28.	1.72	2.57	1.23	1.84
29.	....	1.14	.45	.80
30.	4.25	3.37	3.86	3.83
31.	....	1.30	1.76	1.53

TABLE 7--Continued

32.	2.29	....	3.41	2.85
33.	2.32	....	1.38	1.65
34.	....	3.89	3.32	3.60
35.	4.04	3.28	3.55	3.62
36.	4.07	3.19	4.55	3.94
37.	3.32	2.19	3.68	3.06
38.	1.00	1.41	1.05	1.16
39.	.68	1.48	.50	.89
40.	2.74	2.52	4.00	3.09
41.	2.86	2.91	3.41	3.06
42.	2.50	3.37	4.18	3.35
43.	3.50	2.81	4.14	3.48
44.	3.93	3.26	4.15	3.78
45.	1.64	2.59	1.77	2.00
46.	2.89	2.43	3.14	2.82
47.	1.96	2.04	1.05	1.67
48.	3.89	3.46	3.50	3.62
49.	3.21	3.21	3.68	3.37
50.	3.18	2.43	1.55	2.39

TABLE 8

INDICATED MEANS OF VALUE-ATTITUDE STATEMENTS
PHYSICS STUDENTS

Question	Television Plus Correspondence	Television Plus Visitation	Television Plus Correspondence Plus Visitation	Mean
1.	2.08	2.64	1.95	2.22
2.	1.17	3.33	1.77	2.09
3.	.75	1.33	.73	.94
4.	3.00	4.06	4.41	3.82
5.	2.92	4.03	3.32	3.42
6.	3.75	....	3.73	3.74
7.	1.42	1.52	.91	1.28
8.	2.00	3.00	1.82	2.27
9.	....	3.70	2.68	3.19
10.	.08	1.00	.09	.39
11.	0	.64	.55	.40
12.	2.08	1.91	3.14	2.38
13.	1.92	3.21	1.86	2.33

14.	.30	1.33	.82	.82
15.	....	3.67	2.82	3.49
16.	1.82	1.06	2.27	1.72
17.	.60	....	.95	..77
18.	.83	1.06	1.45	1.11
19.	3.58	3.21	2.73	3.17
20.	.33	1.70	.68	.90
21.	3.17	3.88	3.95	3.67
22.	1.50	2.45	1.27	1.74
23.	.42	.45	1.05	.64
24.	2.33	2.00	3.41	2.58
25.	2.25	2.55	1.82	2.21
26.	3.50	3.48	3.67	3.55
27.	3.00	2.82	3.77	3.20
28.	.75	1.52	1.00	1.09
29.	....	.97	2.09	1.53
30.	3.33	3.38	4.01	3.64
31.	....	1.64	1.18	1.41
32.	1.00	....	1.18	1.09
33.	3.75	....	4.05	3.90
34.	....	3.94	3.86	3.90
35.	2.50	2.45	2.41	2.45
36.	2.75	4.00	3.82	3.56
37.	1.17	2.84	1.82	1.94
38.	3.08	1.52	1.10	1.90
39.	1.67	.85	.86	1.13
40.	1.75	2.81	2.68	2.41
41.	2.75	3.08	3.36	3.06
42.	3.17	2.76	2.86	2.93
43.	1.67	2.88	1.91	2.15
44.	1.58	2.84	2.36	2.26
45.	2.92	2.91	3.00	2.97
46.	3.25	3.28	4.00	3.51
47.	.75	1.34	.55	.88
48.	3.17	2.69	2.22	2.69
49.	2.25	1.97	1.09	1.77
50.	.92	1.34	2.05	1.44

Analysis of variance indicated that chemistry students felt much more strongly, to a very significant degree ($F = 8.271$, $df = 1$, $p < .01$) about the statements on the questionnaire than did the physics students.

There were only two statements on which both chemistry and physics students felt equally strong to a great degree. The first was that the receiving teacher should view the telecasts with his pupils.

The second was that time was not lost on those days on which the telecast was not received, as this day was planned for local laboratory experience, testing, etc. The chemistry students felt very strongly that thirty minutes of work directed by the receiving teacher should precede or follow the telecast, and that the telecasting and receiving teacher should work as a team. The chemistry group also felt that more laboratory experience should be provided by the local school, while this point was also indicated by the physics group. The physics students felt strongly that the tests sent out by the telecasting teacher were valuable, but that tests were not given too often. The physics students felt that the correspondence course was valuable and that the returning of the graded worksheets was worth while. The chemistry students felt significantly more strongly that the telecasting and receiving teachers should spend more time explaining assignments.

Conclusions

Analyses of the data indicated that there was no significant difference among the three physics groups at the start of the course, and there was no significant difference between them at the end of the course, although the group receiving television plus correspondence plus visitation scored slightly higher than the other two groups on the post-tests.

Analyses of the data showed considerable variation between the chemistry groups. The group receiving television plus correspondence and the group receiving television plus correspondence plus visitation

showed no significant difference on the pre-test, however, a significant difference was found between them at the finish of the course as indicated by the post-test achievement scores. Therefore, in the chemistry course at least, since the studying group receiving television plus correspondence plus visitation achieved significantly better than the student group receiving television plus correspondence, which did not have visitation from the college student; the variable of the visitations plus the correspondence course variable provided in conjunction with the presentation of the telecasts appears to produce significantly better achievement by the student than does either method presented alone in conjunction with the telecasts.

APPENDIX A.

PROPOSAL FOR THE STUDY

APPLICATION TO THE COMMISSIONER OF EDUCATION, U. S. OFFICE OF EDUCATION
DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE, FOR A GRANT TO SUPPORT
A RESEARCH PROJECT UNDER THE PROVISIONS OF TITLE VII OF THE
NATIONAL DEFENSE EDUCATION ACT OF 1958 (P. L. 85-864)

Submitted by:	Oklahoma State Board of Education
Address:	Capitol Building, Oklahoma City, Oklahoma
Telephone number:	JAckson 5-2153
Initiated by:	Elvin Leon Hibbs, Director Division of Television Instruction Oklahoma State Department of Education and John W. Dunn, Director Oklahoma Educational Television Authority
Transmitted by:	Oliver Hodge, State Superintendent of Public Instruction, and President of State Board of Education
Date:	January 25, 1960

_____
Elvin Leon Hibbs

_____
John W. Dunn

_____
Oliver Hodge

I. Project Title. A study which compares instruction in high school physics and chemistry via television plus correspondence courses, television plus personal visitation by college students preparing to teach, and television plus both correspondence courses and personal visitations by college students preparing to teach.

II. Problem. A decision as to operational procedure must be made in Oklahoma's television credit courses by the end of next school year. We have been offering filmed credit courses via television to students in small high schools who would not have had opportunities to take these courses without such an arrangement unless they obtained their instruction via correspondence study. We have used itinerant teachers in addition to the television presentations with much success. This is an expensive arrangement and cannot be continued because of inadequate finances and because our television operation has expanded to two open-circuit television stations, KOED-TV-Tulsa and KETA-TV-Oklahoma City, which reach parts of thirty-five (35) counties. This requires several itinerant teachers if they are to visit schools often enough to be effective. It is, therefore, necessary for us to use some other effective arrangement of a less expensive nature. Some of the leading educators of Oklahoma have suggested that we should follow the work of the University of Nebraska and use correspondence study to replace the itinerant teachers. Others, however, have suggested that the personal contact offered by the itinerant teachers is invaluable and should not be discarded. These circumstances suggested the possibility that ten (10) college students, from ten (10)

institutions of higher learning located within the broadcasting area, in their junior or senior years who are preparing to teach physics or chemistry could visit the high school students, in the capacity to itinerant teachers, at least once a week to bring about personal contact in the total instructional program and also to help give the college students invaluable experience in dealing with the television classes and with talented students from small high schools.

We are cognizant of the fact that the University of Nebraska Correspondence Study Division has prepared correspondence courses for both the Harvey White Physics films and the John Baxter Chemistry films which we would use in this plan. We, however, have no intention to evaluate the physics or chemistry films or to evaluate the Nebraska Correspondence Courses. Our chief concern is to compare the amount of achievement of high school students who have been exposed to different types of instruction with the filmed courses via television as constants.

We are also cognizant of the degree of success with correspondence courses as we worked with persons from Nebraska and exchanged several visitations so that the work we are doing would not duplicate theirs. However, we have not compared the arrangements through controlled scientific designs.

The proposed research which we are suggesting in this document would not only help reveal pertinent information concerning television plus correspondence instruction which could be of great value to other states with problems similar to those of Nebraska and Oklahoma, but it could also help us make an imperative

operational decision.

Thus, the problem may be formally stated as: What levels of achievement will instruction in high school physics and chemistry yield when the instruction is offered via television plus correspondence courses, television plus personal visitation by college students preparing to teach, and television plus both correspondence courses and personal visitations by college students preparing to teach?

III. Objectives.

First Hypothesis: There are no differences in achievement among high school students who receive physics and chemistry instruction by television plus personal visitations by college students preparing to teach, and those who receive instruction by television plus both correspondence courses and personal visitations by college students preparing to teach. Second Hypotheses: There are no differences in stated value-attitudes toward instructional television classes among high school students who receive physics and chemistry instruction by television plus correspondence study, those who receive instruction by television plus personal visitations by college students preparing to teach, and those who receive instruction by television plus both correspondence courses and personal visitations by college students preparing to teach.

IV. Procedure.

a. General method and experimental design

1. Controls. No control group per se will be used

in this design.

2. Sample Plan and Procedure. The study is based on a population of approximately three hundred (300) high school students who are enrolling for credit in physics or chemistry through the Division of Television Instruction of the Oklahoma State Department of Education. These students will be regular students in approximately forty-five (45) small high schools of Oklahoma and they would not otherwise be able to take these courses because of lack of qualified teachers or classes too small to justify offering these specialized courses.

Stratified random sampling will be used with the approximately one hundred fifty (150) physics students selected as follows:

T. V. Plus Correspondence	50 students
T. V. Plus Visitations	50 students
T. V. Plus Visitations Plus Correspondence	50 students

The chemistry students will be similarly distributed.

The various strata will be by school districts according to the number of television credit students enrolled.

1 - 2 students	Strata 1
3 - 5 students	Strata 2
6 -10 students	Strata 3
11 or more students	Strata 4

The school districts will be placed in the various strata and selected at random to receive

the various treatments. This will be done to keep students in the same school from receiving different treatments which might tend to cancel results.

b. Data--types to be gathered and methods to be used

The Read General Science Test will be used as a pre-test for all groups in the chemistry and physics classes to measure previous achievement.

The Ohio Every Pupil Physics Test will be used as a post-test in the physics classes as a measure of achievement in physics and the Cooperative Chemistry Test of the A. C. S. will be used as a post-test in the chemistry classes as a measure of achievement in chemistry.

A questionnaire to measure stated value-attitudes will be constructed by use of information from the study by Neidt and French[1] and from the Hibbs[2] study. Observations of the director and the ten (10) college students will also be used in constructing the questionnaire.

c. Methods of statistical analysis

Comparison of means through analysis of covariance and the t-test will be used to analyze the data to

---

1. Charles O. Neidt and Joseph I. French, Reaction of High School Students to Television Teachers (University of Nebraska, Lincoln, 1958)

2. Elvin Leon Hibbs, "Value-Attitudes of Administrators, Teachers, and Students Concerning Instructional Television Classes" (unpublished Ed.D. dissertation, Oklahoma State University, 1959)

ascertain the levels of achievement and value-attitudes elicited by the three treatments.

d. Approximate time schedule

The study will take twelve (12) months to make preparations and to gather and analyze the data.

e. Publication plans

After the study has been completed, the results of the study will be published in mimeograph form at the expense of the Oklahoma State Department of Education.

V. Personnel. The principal investigator is Elvin Leon Hibbs, Director, Division of Television Instruction, Oklahoma State Department of Education. He has been assistant director of a research project in the use of educational television which was sponsored by the Fund for the Advancement of Education. He has done considerable research in the area of value-attitudes of administrators, teachers, and students concerning instructional television classes.

VI. Facilities. The Oklahoma Educational Television Authority has two educational television stations which are broadcasting many programs used as major resources for classes in one hundred twenty-five (125) school districts. We are also offering the Harvey White Physics Course and the John Baxter Chemistry Course over these two stations. The Oklahoma Educational Television Authority and the Oklahoma City Public Schools will pay the television royalties for these copies and they own copies of both film series. We have adequate physical and organizational facilities to carry out this project.

VII. Duration.

Total amount of time required: 1 year

Beginning: July 1, 1960 Ending: June 30, 1961

APPENDIX B.

PARTICIPATING INSTITUTIONS

PARTICIPATING HIGH SCHOOLS

CHEMISTRY

Arcadia High School ---------- Arcadia, Oklahoma

Asher High School ---------- Asher, Oklahoma

Dewar High School ---------- Dewar, Oklahoma

Dibble High School ---------- Dibble, Oklahoma

Dover High School ---------- Dover, Oklahoma

Earlsboro High School ---------- Earlsboro, Oklahoma

Goltry High School ---------- Goltry, Oklahoma

Greenfield High School ---------- Greenfield, Oklahoma

Hinton High School ---------- Hinton, Oklahoma

Minco High School ---------- Minco, Oklahoma

Mound Valley High School ---------- Hominy, Oklahoma

Oklahoma Bible Academy ---------- Meno, Oklahoma

Piedmont High School ---------- Piedmont, Oklahoma

Pleasant Grove High School ---------- Seminole, Oklahoma

Pocasset High School ---------- Pocasset, Oklahoma

Washington High School ---------- Washington, Oklahoma

Weleetka High School ---------- Weleetka, Oklahoma

Wellston High School ---------- Wellston, Oklahoma

PARTICIPATING HIGH SCHOOLS

PHYSICS

Barnsdall High School ---------- Barnsdall, Oklahoma

Crooked Oak High School ---------- Oklahoma City, Oklahoma

Foyil High School ---------- Foyil, Oklahoma

Hinton High School ---------- Hinton, Oklahoma

Jet High School ---------- Jet, Oklahoma

Luther High School ---------- Luther, Oklahoma

Lookeba-Sickles High School ---------- Lookeba, Oklahoma

Marshall High School ---------- Marshall, Oklahoma

Minco High School ---------- Minco, Oklahoma

Ochelata High School ---------- Ochelata, Oklahoma

Okarche High School ---------- Okarche, Oklahoma

Omega High School ---------- Omega, Oklahoma

Orlando High School ---------- Orlando, Oklahoma

Piedmont High School ---------- Piedmont, Oklahoma

Sacred Heart High School ---------- El Reno, Oklahoma

Waukomis High School ---------- Waukomis, Oklahoma

COLLEGES PROVIDING VISITING PERSONNEL

Central State College ---------- Edmond, Oklahoma

East Central State College ---------- Ada, Oklahoma

Northwestern State College ---------- Alva, Oklahoma

Oklahoma Baptist University ---------- Shawnee, Oklahoma

Oklahoma State University ---------- Stillwater, Oklahoma

Oklahoma University ---------- Norman, Oklahoma

Southwestern State College ---------- Weatherford, Oklahoma

Tulsa University ---------- Tulsa, Oklahoma

APPENDIX C.

TEST INFORMATION

A.C.S. - N.S.T.A.

COOPERATIVE CHEMISTRY TEST IN HIGH SCHOOL CHEMISTRY

FORM N.

TABLE OF STANDARDIZATION POPULATION PERCENTILE RANKS

Raw Scores
Maximum Possible Score 90

Percentile Rank	Sub Group A*	Sub Group B*	Sub Group C*	Sub Group D*	Entire Group**
99	81.0	80.7	74.3	83.6	81.0
95	66.0	71.2	63.5	76.2	72.2
90	59.3	64.8	56.8	72.5	64.0
85	55.7	60.2	53.0	68.1	58.7
20	48.5	56.0	49.8	64.2	54.4
75	43.6	52.0	47.0	60.9	51.0
70	39.5	49.3	44.4	58.2	48.3
65	37.5	46.6	41.6	56.1	45.2
60	34.3	44.1	39.5	53.5	42.7
55	31.8	41.6	38.0	50.7	40.0
50	29.4	39.3	36.5	48.8	37.7
45	27.3	37.2	34.5	46.5	35.1
40	24.7	34.8	32.3	43.8	32.9
35	22.6	34.3	20.7	40.6	30.4
30	20.6	29.5	28.7	38.3	27.8
25	18.7	26.8	26.1	35.4	25.2
20	16.2	24.5	24.0	32.7	22.7
15	13.7	21.3	21.8	30.0	19.7
10	11.5	17.7	18.9	25.9	16.5
5	8.2	13.0	13.5	19.8	11.8
1	4.7	6.2	8.7	11.3	5.2
No. of Students	523	3265	586	652	2143

*Key to Sub
Sub Group A, Soph., Jr. & Sr., No Physics, 0-2 Sem. Math.
Sub Group B, Juniors, No Physics, 4-6 Sem. Math.
Sub Group C, Seniors, No Physics, 6-8 Sem. Math.
Sub Group D, Seniors, 2 Sem. Physics, 6-8 Sem. Math.
**Random sample of 2143 papers taken from total returns of 7164 papers

A.S.C. - N.S.T.A.

COOPERATIVE CHEMISTRY TEST

HIGH SCHOOL CHEMISTRY

FORM N.

TV PLUS CORRESPONDENCE		TV PLUS VISITATION		TV PLUS CORRES. PLUS VISIT.	
0	2	0	4	5	1
1	2	3	2	10	1
3	3	4	1	11	1
5	4	6	3	12	1
8	1	7	2	13	1
9	1	8	1	14	1
11	1	9	1	15	1
13	1	11	1	18	2
17	3	12	1	19	2
19	1	13	1	20	2
20	1	14	2	22	2
21	2	16	1	26	1
25	1	21	2	27	2
26	1	25	1	29	1
31	1	27	1	34	1
44	1	30	1	35	1
57	1			41	1
64	1			42	1
				53	1
				71	1
	28		25		25
Median	12	Median	8	Median	20
Mean	16.1	Mean	10.5	Mean	24.9

Ohio Physics Every Pupil Test

Standardization Population

Percentile Norms

Possible Score ---------- 95

Percentile	Score
99th	87
95th	78
90th	73
80th	67
75th	64
70th	62
60th	57
50th	53
40th	49
30th	45
25th	43
20th	40
10th	34
5th	30
1st	22

Number Pupils Reported -------- 2560

Highest Score Reported -------- 95

Lowest Score Reported --------- 12

PHYSICS EVERY PUPIL TEST

Test Score	Entire Group No. Pupils	TV Plus Corres. No. Pupils	TV Plus Visit. No. Pupils	TV Plus Corres. Plus Visit. No. Pupils
13	2	0	0	2
16	1	0	1	0
17	1	0	1	0
18	1	0	1	0
19	1	0	0	1
22	2	1	1	0
24	1	0	1	0
26	2	1	1	0
27	2	0	1	1
28	4	3	1	0
29	2	1	0	1
30	2	1	0	1
31	5	0	3	2
32	1	0	1	0
33	1	0	1	0
34	2	1	0	1
35	4	2	1	1
36	3	1	1	1
37	2	1	0	1
38	3	1	2	0
40	1	0	0	1
41	2	2	0	0
42	3	0	2	1
43	1	1	0	0
45	3	2	1	0
46	1	0	1	0
47	2	0	2	0
49	2	0	1	1
51	1	0	1	0
52	2	0	1	1
54	2	0	0	1
55	2	0	2	0
56	2	0	2	0
58	1	0	0	1
59	2	0	0	2
60	1	0	1	0
62	1	1	0	0
64	1	1	0	0
66	1	0	1	0
67	1	0	1	0
69	1	0	1	0
72	1	0	0	1
76	1	0	0	1
77	1	0	0	1
TOTAL	77	20	34	23
MEDIAN	37	35.5	40	37
MEAN	40.38	37.35	40.97	42.48

PUPIL'S INDIVIDUAL SCORE

A QUESTIONNAIRE CONCERNING EDUCATIONAL TELEVISION AND THE TEACHING OF CHEMISTRY AND PHYSICS BY TELEVISION PLUS CORRESPONDENCE, TELEVISION PLUS WEEKLY COLLEGE VISITATION AND TELEVISION PLUS CORRESPONDENCE PLUS WEEKLY COLLEGE VISITATION

Personal Information--Part I

Directions: Answer each of the following questions by placing the number of the statement which best answers the question in the blank space provided before the question.

Example: __2__ The capital city of the United States is ...
(1) Little Rock (2) Washington D. C. (3) Dallas.

_____ 1. I am associated with the telecasts in the following way: (1) Student (2) Supervising Classroom Teacher (3) Supervising Classroom Teacher and Administrator (4) College Student working with High School Students.

_____ 2. Please indicate (1) Male (2) Female.

_____ 3. Which is the case for you?
(1) Volunteered to work with instructional television class
(2) Assigned to work with television class.

_____ 4. Teleclass for which you are reporting in this questionnaire
(1) Physics (2) Chemistry (3) Both.

_____ 5. Which type of instruction did you receive? (1) Television plus correspondence (2) Television plus weekly college visitation. (Omit questions in Part II which do not apply to your type of instruction)

_____ 6. Which type of instruction would you prefer? (1) Local Teacher (2) Telecasts.

_____ 7. If you were to enroll in another television course, would you prefer (1) Television plus visitation (2) Television plus correspondence (3) Television plus visitation plus correspondence (4) Telecasts only.

Questionnaire--Part II

Directions: The following list contains statements pertaining to instructional television classes and certain practices connected with these classes.

Please indicate by encircling the number after each statement the degree to which you agree with the statement, according to the following scale:

0 ---------- Not at all
1 ---------- To a small degree
2 ---------- To some degree
3 ---------- To a considerable degree
4 ---------- To a great degree
5 ---------- To a very great degree

For example: Most persons are willing to help someone who needs help. 0 1 2 3 (4) 5
This would mean that you agree <u>to a great degree</u> with the statement.

1. The studio teacher should spend more time in discussing the assignment over the air. 0 1 2 3 4 5

2. Tests should be sent more often from the teacher. 0 1 2 3 4 5

3. The tests sent out by the studio teacher are not valuable in helping the student. 0 1 2 3 4 5

4. The receiving teacher should view the telecasts regularly with the students. 0 1 2 3 4 5

5. The receiving teacher should follow or precede the thirty-minute telecast with thirty-minutes of classroom or laboratory work. 0 1 2 3 4 5

6. The correspondence course based on the telecasts are of great value. 0 1 2 3 4 5

7. Laboratory work is not needed in addition to demonstrations shown on telecasts. 0 1 2 3 4 5

8. Instructional television is a poor substitute for a well qual'fied classroom teacher. 0 1 2 3 4 5

9. The weekly visit from the college student was of great value. 0 1 2 3 4 5

10. Instructional television does more harm than good. 0 1 2 3 4 5

11. Tests are given too often by the studio teacher. 0 1 2 3 4 5

12. Teleclasses should be offered by a local school only

	in those areas of learning in which the local school is not prepared to offer courses.	0 1 2 3 4 5
13.	Television classes are a poor substitute for a well qualified classroom teacher.	0 1 2 3 4 5
14.	Instructional television classes have little value in education.	0 1 2 3 4 5
15.	The weekly visit from the college student has been most helpful.	0 1 2 3 4 5
16.	Instructional television is as effective as a qualified classroom teacher.	0 1 2 3 4 5
17.	The correspondence course is of little value since it is a duplication of the work covered by the telecasts.	0 1 2 3 4 5
18.	Telecasts should be increased in length to 40 minutes, 4 days per week.	0 1 2 3 4 5
19.	Telecasts should remain as they are which is 30 minutes per day, 4 days per week.	0 1 2 3 4 5
20.	Telecasts should be 30 minutes per day, but only three days per week.	0 1 2 3 4 5
21.	The day on which telecasts are not received have been most valuable.	0 1 2 3 4 5
22.	Two days per week without telecasts would improve the courses in that it would provide more time for laboratory work.	0 1 2 3 4 5
23.	The day on which telecasts have not been received has been time lost.	0 1 2 3 4 5
24.	More courses should be offered for credit by instructional television.	0 1 2 3 4 5
25.	Credit for instructional television courses should be discontinued as soon as qualified teachers are available for the local schools.	0 1 2 3 4 5
26.	Instructional television is a teaching aid rather than a teacher substitute.	0 1 2 3 4 5
27.	Instructional television has been successful, and should be continued as well as expanded.	0 1 2 3 4 5
28.	The assignments need not be discussed by the studio teacher over the air.	0 1 2 3 4 5

29. The weekly visits from the college student has been of little value. 0 1 2 3 4 5

30. Telecasts reviews are quite important since the pupil cannot ask the telecast teacher questions. 0 1 2 3 4 5

31. The college student talked over my head most of the time. 0 1 2 3 4 5

32. The correspondence course was too much work for value received. 0 1 2 3 4 5

33. The correspondence course was well organized and worth while. 0 1 2 3 4 5

34. The college student has a strong background and has been able to answer questions to my satisfaction. 0 1 2 3 4 5

35. The subject matter was covered too fast for me. 0 1 2 3 4 5

36. Telecasting teacher and receiving teacher should work together as a team. 0 1 2 3 4 5

37. The receiving teacher should accept more responsibility. 0 1 2 3 4 5

38. The local school library has been adequate and reference materials have been readily accessible. 0 1 2 3 4 5

39. Laboratory experience was provided by my local school to supplement the telecasts. 0 1 2 3 4 5

40. The local school library was inadequate for the course. 0 1 2 3 4 5

41. The correspondence course should be used as outside enrichment to help broaden and make clear points missed in the telecasts. 0 1 2 3 4 5

42. Television instruction, for credit, should be limited to those students with special interest and ability in the subject. 0 1 2 3 4 5

43. I would have liked to have sent written questions to the television teacher for him to answer at a later telecast. 0 1 2 3 4 5

44. Should an instructional television course provide time on the schedule for the telecasting teacher to answer questions from the pupils? 0 1 2 3 4 5

45. Since I have not been able to ask the telecasting teacher questions I have developed the ability to find the answer and become more self reliant. 0 1 2 3 4 5

46. I always check the graded worksheet when they were returned as a continuation of my learning experience. 0 1 2 3 4 5

47. The returning of the graded worksheets was of little value as I was interested only in the grade I had made. 0 1 2 3 4 5

48. The picture was not clear at times. 0 1 2 3 4 5

49. The sound was not audible at times. 0 1 2 3 4 5

50. Other school functions caused me to miss too many telecasts. 0 1 2 3 4 5

CHEMISTRY QUESTIONNAIRE — TELEVISION PLUS CORRESPONDENCE

Question No.	Omissions	0	1	2	3	4	5	Total
1	1	0	0	1	11	7	8	28
2	0	12	7	1	4	4	0	28
3	2	8	4	9	3	1	1	28
4	0	0	1	2	4	4	17	28
5	0	0	0	1	3	2	22	28
6	0	4	3	7	2	7	5	28
7	2	19	2	0	3	1	1	28
8	0	1	5	5	1	2	14	28
9	21	3	2	0	0	1	1	28
10	1	15	5	0	5	1	1	28
11	1	17	3	2	1	1	3	28
12	0	5	4	2	4	4	9	28
13	0	2	2	2	4	4	14	28
14	1	10	4	4	5	3	1	28
15	23	2	1	1	0	0	1	28
16	1	13	5	4	1	2	2	28
17	1	14	3	4	3	2	1	28
18	0	16	4	0	3	0	5	28
19	0	8	5	2	1	2	10	28
20	0	16	1	0	3	1	7	28
21	0	4	0	1	6	3	14	28
22	0	7	3	1	2	2	13	28
23	0	18	4	3	2	0	1	28
24	0	8	3	3	7	3	4	28
25	0	10	4	1	4	5	4	28
26	0	4	4	3	4	2	11	28
27	0	9	0	6	6	4	3	28
28	0	12	5	2	2	1	6	28
29	22	2	0	0	2	0	2	28
30	0	1	1	1	2	5	18	28
31	21	2	0	0	2	1	2	28
32	0	7	4	2	8	3	4	28
33	0	6	2	6	7	5	2	28
34	22	1	1	1	0	0	3	28
35	1	1	1	2	4	3	16	28
36	0	0	0	3	7	3	15	28
37	0	3	1	4	6	4	10	28
38	1	15	5	2	3	1	1	28
39	0	17	6	3	1	1	0	28
40	1	4	4	3	7	2	7	28
41	0	2	2	8	8	2	6	28
42	0	9	2	3	1	6	7	28
43	0	2	2	1	7	7	9	28
44	0	1	2	0	4	9	12	28
45	0	8	6	4	8	2	0	28
46	0	3	4	2	8	6	5	28
47	0	12	1	3	5	2	5	28
48	0	2	1	4	2	1	18	28
49	0	7	2	1	2	0	16	28
50	0	3	4	1	7	3	10	28

CHEMISTRY QUESTIONNAIRE — TELEVISION PLUS VISITATION

Question No.	Omissions	0	1	2	3	4	5	Total
1	0	0	7	5	6	5	5	28
2	0	13	6	5	4	0	0	28
3	0	10	3	7	7	0	1	28
4	0	0	0	5	4	4	15	28
5	0	0	2	3	6	3	14	28
6	7	4	2	3	5	6	1	28
7	0	11	2	2	2	8	3	28
8	1	0	4	4	8	2	9	28
9	0	1	1	4	3	7	12	28
10	0	16	4	1	1	4	2	28
11	1	8	3	5	4	1	6	28
12	0	1	3	5	7	1	11	28
13	0	4	2	6	2	1	13	28
14	0	8	2	10	1	2	5	28
15	0	0	1	5	2	6	14	28
16	0	14	4	5	2	0	3	28
17	4	13	2	5	4	0	0	28
18	0	20	2	0	2	1	3	28
19	0	6	1	5	3	2	11	28
20	1	16	0	2	3	0	6	28
21	0	3	5	4	4	5	7	28
22	0	7	5	3	4	2	7	28
23	0	17	2	2	0	0	7	28
24	0	4	3	5	2	4	10	28
25	0	9	4	3	5	1	6	28
26	0	7	0	2	6	3	10	28
27	0	2	6	4	3	3	10	28
28	0	15	1	3	0	0	9	28
29	0	18	1	2	3	2	2	28
30	1	5	0	4	2	3	13	28
31	1	15	4	0	4	1	3	28
32	5	10	2	0	4	3	4	28
33	6	8	0	4	5	0	5	28
34	1	2	0	3	3	5	14	28
35	3	3	3	4	5	4	6	28
36	1	5	2	1	4	5	10	28
37	1	7	3	4	7	3	3	28
38	1	11	3	7	4	1	1	28
39	1	15	2	2	2	2	4	28
40	1	10	1	1	2	6	7	28
41	5	3	3	3	4	4	6	28
42	1	1	1	4	10	3	8	28
43	1	2	5	4	7	3	6	28
44	1	1	2	3	9	7	5	28
45	1	2	3	8	7	5	2	28
46	0	8	0	3	11	1	5	28
47	0	11	0	5	4	5	3	28
48	0	1	5	1	6	3	12	28
49	0	2	6	2	4	2	12	28
50	0	5	4	6	5	3	5	28

CHEMISTRY QUESTIONNAIRE — TELEVISION PLUS CORRES. PLUS VISIT.

Question No.	Omissions	0	1	2	3	4	5	Total
1	1	2	2	3	7	2	5	22
2	0	8	1	7	3	0	3	22
3	1	10	3	1	4	1	2	22
4	1	1	0	0	1	8	11	22
5	1	0	0	0	2	4	15	22
6	0	5	2	3	3	5	4	22
7	0	17	2	1	0	0	2	22
8	0	1	0	2	2	2	15	22
9	0	0	1	3	2	4	12	22
10	0	11	2	4	3	0	2	22
11	0	14	2	1	2	0	3	22
12	0	5	1	1	2	3	10	22
13	0	1	0	1	1	2	17	22
14	0	8	3	4	5	1	1	22
15	0	0	1	4	1	6	10	22
16	0	18	3	0	1	0	0	22
17	0	12	2	4	1	2	1	22
18	0	14	4	2	1	1	0	22
19	0	6	0	3	0	6	7	22
20	0	12	2	3	2	0	3	22
21	0	0	1	2	3	2	14	22
22	0	2	1	4	2	4	9	22
23	0	20	0	1	1	0	0	22
24	0	12	3	3	2	2	0	22
25	0	2	2	0	5	4	9	22
26	0	3	4	1	3	3	8	22
27	0	5	4	8	1	2	2	22
28	0	14	1	1	2	2	2	22
29	0	17	1	3	1	0	0	22
30	1	3	0	1	0	6	11	22
31	1	6	5	3	4	1	2	22
32	0	1	3	4	2	2	10	22
33	1	10	3	1	4	3	0	22
34	0	1	1	2	7	8	3	22
35	0	2	0	4	4	2	10	22
36	0	0	0	0	3	4	15	22
37	0	1	2	3	3	1	12	22
38	1	13	2	2	1	2	1	22
39	0	16	4	0	1	1	0	22
40	0	1	1	3	1	2	14	22
41	0	2	1	2	3	9	15	22
42	0	0	0	3	3	3	13	22
43	0	0	1	0	6	3	12	22
44	2	0	1	0	2	9	8	22
45	0	7	4	3	5	1	2	22
46	0	0	3	4	7	3	5	22
47	0	14	1	2	3	1	1	22
48	0	2	3	1	1	6	9	22
49	0	3	1	1	2	3	12	22
50	0	8	4	3	5	1	1	22

CHEMISTRY QUESTIONNAIRE — ENTIRE STUDENT GROUP

Question No.	Omissions	0	1	2	3	4	5	Total
1	2	2	9	9	24	14	18	78
2	0	33	14	13	11	4	3	78
3	3	28	10	17	14	2	4	78
4	1	1	1	7	9	16	43	78
5	1	0	2	4	11	9	51	78
6	7	13	7	13	10	18	10	78
7	2	47	6	3	5	9	6	78
8	1	2	9	11	11	6	38	78
9	21	4	4	7	5	12	25	78
10	1	42	11	5	9	5	5	78
11	2	39	8	8	7	2	12	78
12	0	11	8	8	13	8	30	78
13	0	7	4	9	7	7	44	78
14	1	26	9	18	11	6	7	78
15	23	2	3	10	3	12	25	78
16	1	45	12	9	4	2	5	78
17	5	39	7	13	8	4	2	78
18	0	50	10	2	6	2	8	78
19	0	24	6	10	4	10	28	78
20	1	40	3	5	8	1	16	78
21	0	7	6	7	13	10	35	78
22	0	16	9	8	8	8	29	78
23	0	55	6	5	3	1	8	78
24	0	24	9	11	11	9	14	78
25	0	21	10	4	14	10	19	78
26	0	14	8	6	13	8	29	78
27	0	16	10	18	10	9	15	78
28	0	41	7	6	4	3	17	78
29	22	37	2	5	6	2	4	78
30	2	9	6	6	4	14	42	78
31	23	23	9	3	10	3	7	78
32	5	18	9	6	14	8	18	78
33	7	24	5	11	16	8	7	78
34	23	4	2	6	10	13	20	78
35	4	6	4	10	13	9	32	78
36	1	6	2	7	14	10	38	78
37	1	11	6	11	16	8	25	78
38	3	39	10	11	8	4	3	78
39	1	48	12	5	4	4	4	78
40	2	15	6	7	10	10	28	78
41	5	7	6	13	15	15	17	78
42	1	10	3	10	14	12	28	78
43	1	4	8	5	20	13	27	78
44	3	2	5	3	15	25	25	78
45	1	17	13	15	20	8	4	78
46	0	11	7	9	36	10	15	78
47	0	37	2	10	12	8	9	78
48	0	5	9	6	9	10	39	78
49	0	12	9	4	8	5	40	78
50	0	16	12	10	17	7	16	78

PHYSICS QUESTIONNAIRE — TELEVISION PLUS CORRESPONDENCE

Question No.	Omissions	0	1	2	3	4	5	Total
1	0	1	2	4	5	0	0	12
2	0	5	1	5	1	0	0	12
3	0	8	1	1	2	0	0	12
4	1	2	0	1	2	2	4	12
5	0	1	2	1	2	3	3	12
6	0	0	1	0	5	1	5	12
7	0	7	0	1	2	1	1	12
8	0	1	4	3	3	0	1	12
9	12	0	0	0	0	0	0	12
10	0	11	1	0	0	0	0	12
11	1	11	0	0	0	0	0	12
12	0	5	0	3	0	1	3	12
13	0	3	3	1	3	1	1	12
14	0	8	4	0	0	0	0	12
15	12	0	0	0	0	0	0	12
16	0	1	4	4	2	1	0	12
17	0	8	1	3	0	0	0	12
18	0	8	2	0	1	0	1	12
19	0	2	0	1	1	2	6	12
20	0	10	0	2	0	0	0	12
21	0	2	0	2	1	4	3	12
22	0	5	1	2	3	1	0	12
23	0	9	1	2	0	0	0	12
24	0	1	1	6	2	1	1	12
25	0	6	0	1	1	3	1	12
26	0	1	0	2	2	3	4	12
27	0	0	2	2	3	3	2	12
28	0	8	2	0	1	1	0	12
29	12	0	0	0	0	0	0	12
30	0	2	1	0	2	2	5	12
31	11	0	1	0	0	0	0	12
32	0	8	1	1	0	1	1	12
33	0	0	1	1	2	4	4	12
34	12	0	0	0	0	0	0	12
35	0	1	2	3	3	2	1	12
36	0	1	2	2	1	6	0	12
37	0	5	4	0	2	1	0	12
38	0	2	2	0	1	3	4	12
39	0	5	3	0	1	1	2	12
40	0	5	0	3	1	3	0	12
41	0	1	3	2	0	4	2	12
42	0	1	1	0	4	5	1	12
43	0	4	2	2	2	2	0	12
44	0	3	5	2	0	0	2	12
45	0	1	2	2	1	4	2	12
46	0	1	1	2	2	2	4	12
47	0	8	2	1	0	0	1	12
48	0	0	2	3	2	1	4	12
49	0	3	3	1	1	1	3	12
50	0	5	6	0	0	0	1	12

PHYSICS QUESTIONNAIRE — TELEVISION PLUS VISITATION

Question No.	Omissions	0	1	2	3	4	5	Total
1	0	6	3	6	8	2	8	33
2	0	2	2	5	9	4	11	33
3	0	17	7	2	0	2	5	33
4	1	1	1	4	2	5	19	33
5	1	1	0	4	4	6	17	33
6	23	1	3	6	0	0	0	33
7	0	14	4	5	6	2	2	33
8	0	7	3	2	5	3	13	33
9	0	2	3	4	3	3	18	33
10	0	19	6	2	3	1	2	33
11	0	26	1	2	2	0	2	33
12	0	17	1	2	2	3	8	33
13	0	6	2	4	4	1	16	33
14	0	18	3	3	4	2	3	33
15	0	2	3	2	6	4	16	33
16	0	15	9	4	3	1	1	33
17	23	6	2	1	1	0	0	33
18	1	19	4	3	2	2	2	33
19	0	8	1	2	1	7	14	33
20	0	18	1	3	2	2	7	33
21	0	2	2	4	1	5	19	33
22	0	9	3	5	4	4	8	33
23	0	28	1	1	1	1	1	33
24	0	12	3	5	4	4	5	33
25	0	14	1	2	3	4	9	33
26	0	4	1	4	4	6	14	33
27	0	6	1	7	6	5	8	33
28	0	19	0	4	2	4	4	33
29	0	22	1	5	1	2	2	33
30	1	4	2	3	4	7	12	33
31	0	13	6	3	5	3	3	33
32	21	2	2	4	1	0	3	33
33	23	3	1	1	3	1	1	33
34	2	3	1	2	1	6	18	33
35	0	6	4	9	5	1	8	33
36	1	0	1	3	5	9	14	33
37	1	6	2	8	1	5	10	33
38	0	15	5	3	5	1	4	33
39	0	15	12	4	0	2	0	33
40	1	7	5	2	2	5	11	33
41	21	1	1	2	2	4	2	33
42	0	7	4	2	6	5	9	33
43	0	4	7	2	7	2	11	33
44	1	6	2	6	5	3	10	33
45	0	3	2	6	10	8	4	33
46	4	1	3	3	6	12	4	33
47	4	15	3	3	4	2	2	33
48	1	3	7	5	6	4	7	33
49	1	9	7	6	3	0	7	33
50	1	18	5	2	3	1	3	33

PHYSICS QUESTIONNAIRE — TELEVISION PLUS CORRES. PLUS VISIT.

Question No.	Omissions	0	1	2	3	4	5	Total
1	0	7	2	2	8	2	1	22
2	0	6	5	3	5	2	1	22
3	0	15	1	4	1	1	0	22
4	0	0	1	1	1	4	15	22
5	0	2	3	0	6	3	8	22
6	0	1	2	3	2	2	12	22
7	0	10	6	5	0	1	0	22
8	0	9	5	0	0	5	3	22
9	0	4	2	6	1	4	5	22
10	0	21	0	1	0	0	0	22
11	0	14	4	4	0	0	0	22
12	1	5	0	2	4	4	6	22
13	0	9	4	1	0	5	3	22
14	0	14	3	1	3	1	0	22
15	0	3	6	2	0	3	8	22
16	0	4	3	3	9	1	2	22
17	0	14	2	2	1	3	0	22
18	0	13	2	0	2	1	4	22
19	0	7	1	2	1	3	8	22
20	0	15	5	0	0	1	1	22
21	0	1	0	1	5	5	10	22
22	0	12	3	1	3	1	2	22
23	0	14	2	3	0	0	3	22
24	0	1	2	3	5	3	8	22
25	0	11	1	1	3	2	4	22
26	1	3	0	0	5	3	10	22
27	0	0	2	1	3	2	14	22
28	0	15	2	0	2	1	2	22
29	0	8	2	3	1	5	3	22
30	4	1	0	0	5	2	10	22
31	0	11	4	2	3	1	1	22
32	0	12	4	2	0	2	2	22
33	0	0	1	2	3	5	11	22
34	0	2	1	8	3	4	4	22
35	0	6	2	3	3	4	4	22
36	0	0	0	2	4	7	9	22
37	0	7	4	1	6	4	0	22
38	1	10	4	3	3	1	0	22
39	0	15	0	4	1	2	0	22
40	0	3	3	4	5	2	5	22
41	0	2	2	1	3	9	5	22
42	0	6	0	2	5	1	8	22
43	0	7	2	4	5	3	1	22
44	0	7	2	3	2	2	6	22
45	0	1	0	7	7	4	3	22
46	0	0	0	0	7	8	7	22
47	0	15	5	0	1	1	0	22
48	0	2	4	8	5	1	2	22
49	0	11	3	5	2	0	1	22
50	0	7	2	5	3	1	4	22

PHYSICS QUESTIONNAIRE — ENTIRE STUDENT GROUP

Question No.	Omissions	0	1	2	3	4	5	Total
1	0	14	7	12	21	4	9	67
2	0	13	8	13	15	6	12	67
3	0	40	9	7	3	3	5	67
4	2	3	2	6	5	11	38	67
5	1	4	5	5	12	12	28	67
6	23	2	6	9	7	3	17	67
7	0	31	10	11	8	4	3	67
8	0	17	12	5	8	8	17	67
9	12	6	5	10	4	7	23	67
10	0	51	7	3	3	1	2	67
11	1	51	5	6	2	0	2	67
12	1	27	1	7	6	8	17	67
13	0	18	9	6	7	7	20	67
14	0	40	10	4	7	3	3	67
15	12	5	9	4	6	7	24	67
16	0	20	16	11	14	3	3	67
17	23	28	5	6	2	3	0	67
18	1	40	8	3	5	3	7	67
19	0	17	2	5	3	12	28	67
20	0	43	6	5	2	3	8	67
21	0	5	2	7	7	14	32	67
22	0	26	7	8	10	6	10	67
23	0	51	4	6	1	1	4	67
24	0	14	6	14	11	8	14	67
25	0	31	2	4	7	9	14	67
26	1	8	1	6	11	12	28	67
27	0	6	5	10	12	10	24	67
28	0	42	4	4	5	6	6	67
29	12	30	3	8	2	7	5	67
30	5	7	3	3	11	11	27	67
31	11	24	11	5	8	4	4	67
32	21	22	7	7	1	3	6	67
33	23	3	3	4	8	10	16	67
34	14	5	2	10	4	10	22	67
35	0	13	8	15	11	7	13	67
36	1	1	3	7	10	22	23	67
37	1	18	10	9	9	10	10	67
38	1	27	11	6	9	5	8	67
39	0	35	15	8	2	5	2	67
40	1	15	8	9	8	10	16	67
41	21	4	6	5	5	17	9	67
42	0	14	5	4	15	11	18	67
43	0	15	11	8	14	7	12	67
44	1	16	9	11	7	5	18	67
45	0	5	4	15	18	16	9	67
46	4	2	4	5	15	22	15	67
47	4	38	10	4	5	3	3	67
48	1	5	13	15	14	6	13	67
49	1	23	13	12	6.	1	11	67
50	1	30	13	7	6	2	8	67

SCHOOL. _____ CREDIBILITY WORKSHEET SCORES 1960-61

NAME OF PUPIL									
1.									
2.									
3.									
4.									
5.									
6.									
7.									
8.									
9.									
10.									
11.									
12.									
13.									
14.									
15.									
16.									
17.									
18.									
19.									
20.									
School Average									
TV & Corres.									
TV, Visits & Corres.									
Avg. of All Schools									

SCHOOL _____ PHYSICS WORKSHEET SCORES 1960-61

NAME OF SCHOOL									
1.									
2.									
3.									
4.									
5.									
6.									
7.									
8.									
9.									
10.									
11.									
12.									
13.									
14.									
15.									
16.									
17.									
18.									
19.									
20.									
School Average									
TV & Corres.									
TV, Visits and Corres.									
Avg. of All Schools									

END
DEPT. OF HEALTH EDUCATION & WELFARE U.S. OFFICE OF EDUCATION ERIC DATE FILMED 6-26-67